

N^o 23,846



A.D. 1903

Date of Application, 3rd Nov., 1903—Accepted, 25th Aug., 1904

COMPLETE SPECIFICATION.

“ Improvements in Stethoscopes and other Instruments for Rendering Weak Sounds more Distinctly Audible ”.

I, HENRY GEORGE ABRAHAM ISAAC WIEDER, of 6, White Lion Street, Bishopsgate, London, in the County of Middlesex, Mechanical Engineer, do hereby declare the nature of this invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement, and accompanying drawing, that is to say:—

My invention relates to stethoscopes or instruments for rendering easily audible weak sounds in the human body, or to instruments of similar kind, such as ear trumpets and the like, used for rendering more audible other sounds.

The accompanying drawing is in illustration of my invention and shows it applied to a stethoscope.

Figure 1 is a section through the centre of the instrument, and Figure 2 is a view from the back.

a is a very thin circular disc, or diaphragm of metal or other suitable material, the edge of which is fitted into the inner edge of a cylindrical ring *b* of brass or other metal or material. *c* is an outer cylindrical case, of ebonite or other like suitable material having a cylindrical recess at *d* into which the ring *b* and diaphragm *a* fit and are inserted, resting against a narrow shoulder at *d* on the inner side of the case *c*. Inside the ring *b* is fitted a circular flat plate *e* of metal or other hard material, having a small slightly projecting rim round its upper edge at *f*, which when inserted in its place presses against and holds the edge of the ring *b* and diaphragm *a*, giving the latter a very rigid tension, and leaving a very narrow space at *g* between it and the face of the plate *e*, which has also an outer flange the edge of which is level with the outer edge of the ring *b*, both being some distance inside the outer edge of the flange of the case *c* which is screwed inside with a fine thread to receive a corresponding ring *h* the outer edge of which is milled at *i* so that it can be readily screwed in with the fingers to fix the ring *b* and diaphragm *a*, or unscrewed when required.

The back of the plate *e* has at its centre a projecting tubular boss *j*, upon which can be screwed a junction piece *k*, having two branches *l*, *l*¹ to which flexible tubes can be easily attached and brought to the ears of the listener.

Such instruments have been made in which the centre of the diaphragm *a* is provided with a rigid cone such as *m*, having an inverted cone such as *n*, on its summit, the edge of this outer cone *n* being capable of being pressed lightly against the part of the body where the sounds proceed which are to be heard, which sounds, however weak, are very largely magnified and are clearly heard by the listener.

I have found however, to obtain the highest efficiency, the central part of the diaphragm *a* must be rendered quite rigid and incapable of independent vibration, and only the part between such rigid centre and the edge must communicate its vibrations to the air in the space between the diaphragm *a* and the plate *e*.

In order to ensure the perfect rigidity of the central part of the diaphragm *a*

[Price 8d.]

Wieder's Improvements in Stethoscopes, &c.

upon which is fitted the open wide end of the thin metal cone *m*, upon the apex of which is fixed the smaller inverted cone *n*, a slightly curved or arched metal disc *p*, is arranged across the back of the diaphragm *a* against which it can be tightened with any desired force by a central bolt *q* the enlarged cylindrical head of which *r*, fits into the bottom of the small cone *n*, through which it passes, whilst its top *r*¹ is curved or spherical in shape. The cone *m* distributes the sound waves equally all round the diaphragm, whilst the top receives the sound.

The bolt *q* passes centrally through the cones *m* and *n*, the diaphragm *a* and the curved disc *p*, which latter is forced up by tightening the nut *s*, (through the opening in the boss *j*) until the centre of the diaphragm *a* is drawn up into the mouth of the cone *m*, as shewn, by the curved disc *p*, the said central part being thus made rigid and non-vibrating and the loudness and clearness of the sounds produced by the instrument being enormously increased.

This arrangement is essential to the perfect working of the instrument.

The spherical top *r*¹ of the bolt *q* projects slightly beyond the edge of the cone *n*, which is pressed gently upon the surface—such as the human breast—the sound from or near which is, to be transmitted through the tubes *l*, *l*¹ to the ear of the listener.

The outer part of the case *c* is formed as a cone *u* the small open end of which surrounds freely the small cone *n*, and the bolt head *r*. This outer cone *u* forms a perfect protection to the diaphragm and to the two cones, whilst occupying very little space. It also serves to protect the diaphragm from any sound or noise going on outside the sphere of the sounds which it is desired to hear, so that it is possible to hear the desired noises very distinctly, but not other noises which are continually going on around.

For greater convenience, and comfort, I make a ring *t* of soft india-rubber or the like material, and of suitable shape, upon the outer edge of the cone *u* of the case, which can be pressed into more close contact without inconvenience.

For some medical or other purposes, such as for stethoscopes, the spherical top *r*¹ of the bolt *q* (or a sufficiently long rigid projecting rod which may be screwed upon it, or form part of it), and the edge of the small cone *n*, are held against or near the position of origin of the sound to be magnified, as for instance the chest, opposite the heart or lungs, and the outer ends of the flexible tubes (or of one of them) are held in the ears (or ear).

It has been found, by experience, that the present invention very much surpasses any other existing instrument in efficiency, portability, and ease of application.

The whole apparatus is purely mechanical, there being no magnet of any kind, nor any electricity used.

The details of construction and the materials used, and the proportions of the several parts, may be varied more or less to suit varying circumstances.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:—

1. In stethoscopes or other like instruments for magnifying small sounds, the combination of the diaphragm having its edge fitted in a ring and held against a projecting rim in an outer case, by a screwed ring, screwed into the case, an outer plate or disc pressed into the case by the same screwed ring and having a narrow central space between its inner flat surface and the diaphragm, a central hollow boss at the back of the outer plate to receive flexible ear tubes, a central cone fitting upon the outer side of the diaphragm, a smaller inverted cone upon the smaller end of the first cone, a curved disc or washer fitted centrally at the back of the diaphragm, a central bolt passing through the axes of the two cones, the diaphragm and the curved disc, a cylindrical head upon the outer end of the bolt having its inner end fitting upon the lower part of the

Wieder's Improvements in Stethoscopes, &c.

inner side of the smaller cone round the hole through the latter and its outer projecting end rounded or hemispherical, and a screwed nut upon the inner end of the bolt by which the curved disc can be drawn up against the diaphragm so as to stretch the central part of the diaphragm and press it up into the wide
5 end of the larger cone, all substantially as and for the purpose described and illustrated.

2. The combination of a thin diaphragm *a* rigidly held at its outer edge, a hollow cone *n* fitting against the centre of the outer side of the diaphragm, a curved disc *p* fitting against the inner side of the diaphragm *a*, a central
10 bolt *q* passing through the centre of the cone *m*, the diaphragm *a* and the curved disc *p*, a cylindrical head *r* having a rounded top *r*¹ on the outer end of the bolt, and a screwed nut *s* at the inner end of the bolt, all substantially as and for the purposes described and illustrated.

3. In combination with the cone *m* described and claimed in Claim 2, a
15 smaller inverted cone *n* upon the outer end of the cone *m* substantially as described and illustrated.

4. A projecting ring of india-rubber or soft material projecting from the outer edge of the cone *n*, substantially as, and for the purpose, described and illustrated.

20 Dated this 3rd day of November 1903.

EDWARDS AND Co.
Chartered Patent Agents,
65 and 66, Chancery Lane, London.
Agents for the Applicant.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1904.



Fig. 1

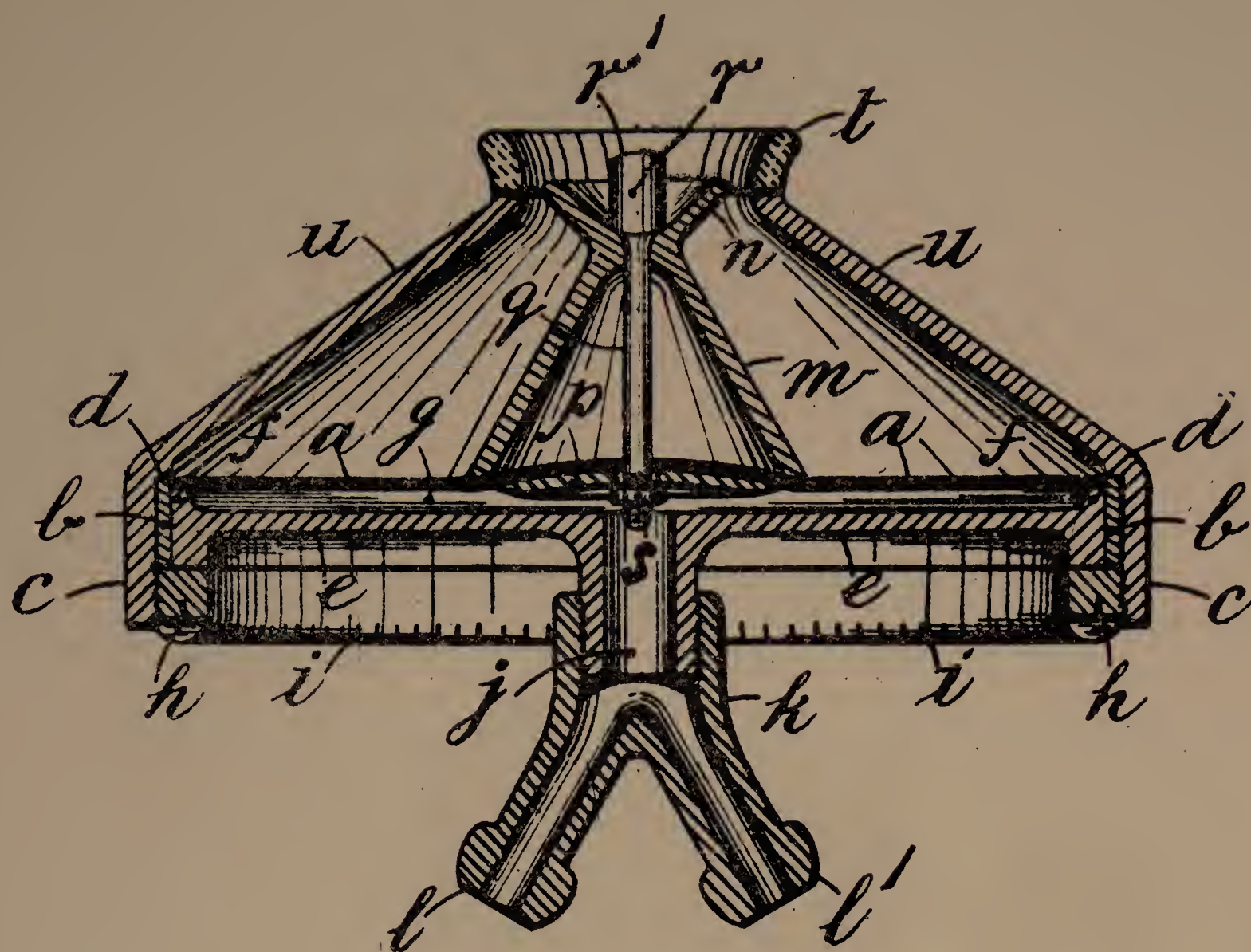
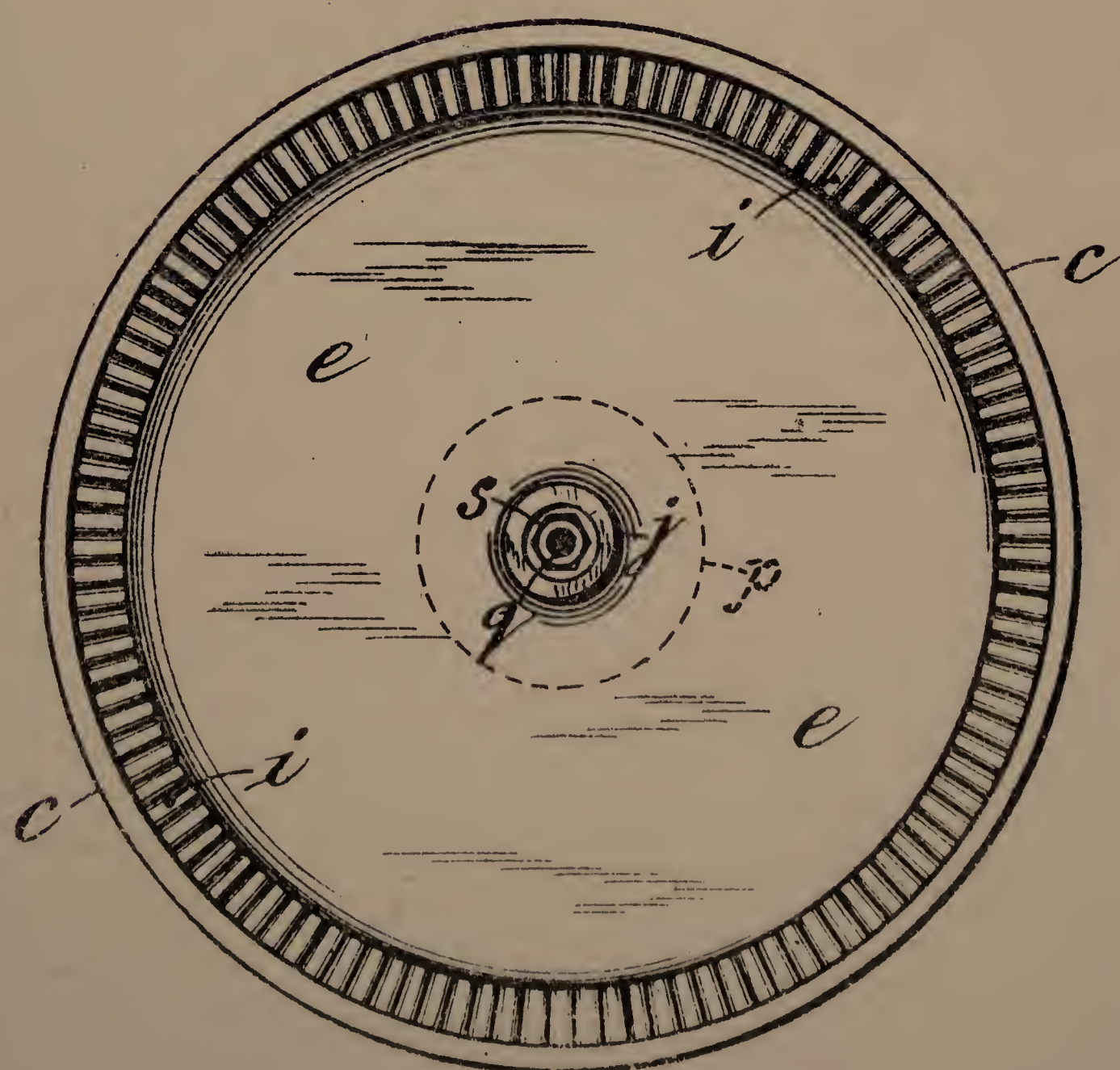


Fig. 2



[This Drawing is a full-size reproduction of the Original.]

